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LAKE JAMES, BURKE AND McDOWELL COUNTIES, NORTH CAROLINA

Pacific Northwest Environmental Research Laboratory

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EUTROPHICATION SURVEY

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TECHNICAL REPORT DATA

Report on Lake James, Burke and McDowell Counties North Carolina

Prepared June 1975

Working Paper # 383

Final 1973

PRICES SUBJECT TO CHANGE

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REPORT
ON
LAKE JAMES
BURKE AND McDOWELL COUNTIES
NORTH CAROLINA
EPA REGION IV
WORKING PAPER No. 383

WITH THE COOPERATION OF THE
NORTH CAROLINA DEPARTMENT OF NATURAL AND ECONOMIC RESOURCES
AND THE
NORTH CAROLINA NATIONAL GUARD

JUNE, 1975

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F O R E W O R D

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the North Carolina Department of Natural and Ecoromic Resources for professional involvement and to the North Carolina National Guard for conducting the tributary sampling phase of the Survey.

Lewis R. Martin, Director of the Division of Environmental Management; Darwin L. Coburn, Chief of the Water Quality Section; and Julian R. Taylor, Supervisor of the Monitoring Program Unit; provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

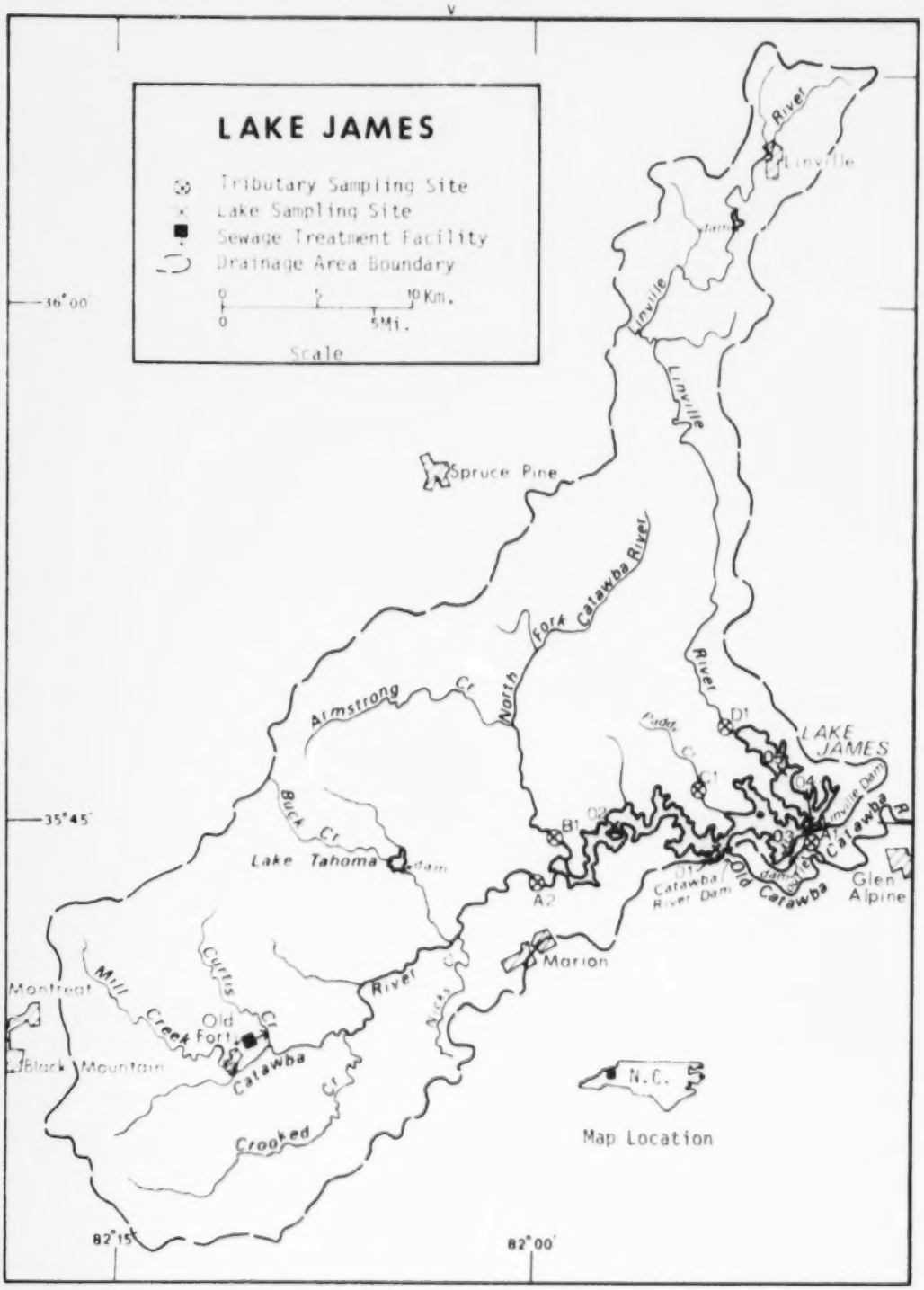
Major General William M. Buck, formerly Adjutant General of North Carolina, and Project Officer Colonel Arthur J. Bouchard, who directed the volunteer efforts of the North Carolina National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF NORTH CAROLINA

LAKE NAME	COUNTY
Badin	Montgomery, Stanly
Blewett Falls	Anson, Richmond
Chatuge	Clay, NC; Towns, GA
Fontana	Graham, Swain
Hickory	Alexander, Caldwell, Catawba
High Rock	Davidson, Rowan
Hiwassee	Cherokee
James	Burke, McDowell
John H. Kerr (Nut Bush Creek)	Granville, Vance, Warren, NC; Halifax, Mecklenburg, VA
Junaluska	Haywood
Lookout Shoals	Alexander, Catawba, Iredell
Mountain Island	Gaston, Mecklenburg
Norman	Catawba, Iredell, Lincoln, Mecklenburg
Rhodhiss	Burke, Caldwell
Santeetlah	Graham
Tillery	Montgomery, Stanly
Waccamaw	Columbus
Waterville	Haywood
Wylie	Gaston, Mecklenburg, NC; York, SC


LAKE JAMES
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
Drainage Area Boundary
0 2 10 Km.
0 5Mi.
Scale
36°00'
35°45'
82°15'
82°00'
Linville River
Linville
Linville
Spruce Pine
North Fork Catawba River
Armstrong Cr
Buck Cr
Lake Tahoma
dam
Rocky Cr
D1
C1
B1
A1
A2
LAKE JAMES
Catawba River
Old Catawba
Glen Alpine
Marion
Curtis Cr
Mill Creek
Montreat
Old Fort
Catawba
Black Mountain
Crooked Cr
N.C.
Map Location

LAKE JAMES

STORET NO. 3708

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate Lake James is eutrophic. It ranked seventh in overall trophic quality when the 16 North Carolina lakes sampled in 1973 were compared using a combination of six parameters as an index*. Nine of the lakes had greater and one had the same median total phosphorus; 11 had greater and one had the same median dissolved phosphorus; 13 had greater and one had the same median inorganic nitrogen; and, while only three lakes had greater mean Secchi disc transparency, only one had greater mean chlorophyll a. Marked depression of dissolved oxygen with depth occurred at all five sampling stations in July and September.

During their visits to the lake, Survey limnologists did not observe any nuisance conditions.

B. Rate-Limiting Nutrient:

The algal assay results indicate that Lake James was phosphorus limited at the time the sample was collected (03/24/73). These results are substantiated by the lake data; i.e., the mean N/P ratios at all sampling times were 17/1 or greater.

* See Appendix A.

C. Nutrient Controllability:

1. Point sources--The phosphorus contribution of point sources amounted to 5.8% of the total load reaching the lake. The Old Fort wastewater treatment plant contributed 5.4% of the total load.

Survey data indicate a total phosphorus loading rate of 1.12 $g/m^2/yr$ which is slightly above the rate (0.94 $g/m^2/yr$) proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic loading rate (see page 13). Therefore, every effort should be made to minimize phosphorus inputs to the lake.

2. Non-point sources--Non-point sources accounted for 94.2% of the total phosphorus input to the lake during the sampling year. The Catawba River accounted for 45.6%, and the North Fork Catawba River accounted for 38.5% of this total.

The North Fork Catawba River had a phosphorus export rate of 51 $kg/km^2/yr$, which is much higher than the rates of the other Lake James tributaries (see page 12). This may have been due to unknown and unsampled point sources impacting this river or its tributaries; e.g., wastes from North Cove, Ashland, or other communities upstream. If such phosphorus sources exist and are controllable, a reduction of the North Fork export rate to the same level as the Catawba River rate (29 $kg/km^2/yr$) would result in lowering the lake loading rate to well below the eutrophic rate and should result in improved water quality. The phosphorus load to downstream Rhodhiss Lake (Working Paper No. 388) would be reduced as well.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS†

A. Lake Morphometry††:

1. Surface area: 26.35 kilometers^2.
2. Mean depth: 13.5 meters.
3. Maximum depth: 43 meters.
4. Volume: 356 x 10^6 m^3.
5. Mean hydraulic retention time: 208 days.

B. Tributary and Outlet:
(See Appendix C for flow data)

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)*
Catawba River	463.6	9.5
North Fork, Catawba River	221.7	3.5
Paddy Creek	16.3	0.3
Linville River	174.0	4.0
Minor tributaries & immediate drainage -	84.8	2.5
Totals	960.4	19.8

2. Outlet -

Catawba River	986.8**	19.8**

C. Precipitation***:

1. Year of sampling: 155.7 centimeters.
2. Mean annual: 129.0 centimeters.

† Table of metric conversions--Appendix B.
†† Park, 1975.
* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".
** Includes area of lake; outflow adjusted to equal sum of inflows.
*** See Working Paper No. 175.

III. LAKE WATER QUALITY SUMMARY

Lake James was sampled three times during the open-water season of 1973 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from five stations on the lake and from a number of depths at each station (see map, page v). During each visit, a single depth-integrated (4.6 m to surface) sample was composited from the five stations for phytoplankton identification and enumeration; and during the first visit, a single 18.9-liter depth-integrated sample was composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 30.5 meters at station 1, 15.2 meters at station 2, 36.6 meters at station 3, 35.1 meters at station 4, and 16.8 meters at station 5.

The lake sampling results are presented in full in Appendix D and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR LAKE JAMES
STORET CODE 3708

PARAMETER	1ST SAMPLING (3/24/73) 5 SITES RANGE	MEAN	MEDIAN	2ND SAMPLING (7/ 5/73) 5 SITES RANGE	MEAN	MEDIAN	3RD SAMPLING (9/24/73) 5 SITES RANGE	MEAN	MEDIAN
TEMP (C)	7.1 - 13.0	10.4	10.4	8.2 - 29.4	21.6	23.4	8.3 - 27.5	21.6	24.4
DISS OXY (MG/L)	9.2 - 11.5	10.0	9.9	2.1 - 10.5	6.5	5.9	0.0 - 8.6	3.3	1.6
CNDCTVY (MCROMO)	50. - 65.	57.	58.	50. - 70.	58.	58.	41. - 86.	59.	55.
PH (STAND UNITS)	7.1 - 8.4	7.7	7.8	6.3 - 9.4	7.5	6.6	6.2 - 8.6	6.6	6.4
TOT ALK (MG/L)	10. - 21.	15.	16.	10. - 19.	14.	14.	10. - 26.	15.	14.
TOT P (MG/L)	0.016 - 0.080	0.040	0.031	0.008 - 0.042	0.018	0.016	0.012 - 0.038	0.021	0.018
ORTHO P (MG/L)	0.003 - 0.033	0.014	0.010	0.002 - 0.030	0.006	0.004	0.004 - 0.015	0.009	0.009
NO2+NO3 (MG/L)	0.030 - 0.320	0.167	0.180	0.040 - 0.460	0.147	0.070	0.020 - 0.420	0.063	0.030
AMMONIA (MG/L)	0.020 - 0.090	0.045	0.040	0.040 - 0.120	0.066	0.060	0.020 - 0.660	0.123	0.050
KJEL N (MG/L)	0.200 - 0.600	0.275	0.200	0.200 - 0.900	0.381	0.300	0.200 - 1.100	0.400	0.300
INORG N (MG/L)	0.060 - 0.380	0.233	0.220	0.080 - 0.520	0.213	0.155	0.050 - 0.700	0.186	0.090
TOTAL N (MG/L)	0.250 - 0.690	0.462	0.485	0.240 - 0.960	0.528	0.500	0.220 - 1.140	0.463	0.425
CHLRPYL A (UG/L)	0.7 - 12.9	6.2	5.3	5.3 - 16.1	9.8	9.1	4.2 - 8.8	7.0	7.7
SECCHI (METERS)	0.5 - 1.5	1.1	1.1	1.2 - 2.7	1.9	1.8	1.9 - 2.7	2.4	2.5

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal units per ml
03/24/73	1. Melosira	556
	2. Asterionella	111
	3. Cyclotella	87
	4. Pennate diatoms	37
	5. Cryptomonas	37
	Other genera	137
	Total	965
07/05/73	1. Tabellaria	821
	2. Anabaena	640
	3. Melosira	181
	4. Cryptomonas	85
	5. Flagellates	85
	Other genera	84
	Total	1,896
09/24/73	1. Lyngbya	1,528
	2. Chroococcus	1,510
	3. Flagellates	588
	4. Raphidiopsis	549
	5. Anabaena	353
	Other genera	1,389
	Total	5,917

2. Chlorophyll *a* -

Sampling Date	Station Number	Chlorophyll *a* (µg/l)
03/24/73	01	5.3
	02	0.7
	03	12.9
	04	7.9
	05	4.1
07/05/73	01	7.6
	02	5.3
	03	16.1
	04	11.1
	05	9.1
09/24/73	01	8.8
	02	8.2
	03	4.2
	04	5.9
	05	7.7

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.010	0.164	0.4
0.010 P	0.020	0.164	2.9
0.020 P	0.030	0.164	2.8
0.050 P	0.060	0.164	3.4
0.025 P + 0.5 N	0.035	0.664	10.7
0.050 P + 1.0 N	0.060	1.164	17.8
1.0 N	0.010	1.164	0.4

2. Discussion -

The control yield of the assay alga, *Selenastrum capricornutum*, indicates that the potential primary productivity of Lake James was moderate at the time of sample collection (03/24/73).

The assay data also indicate that James Lake was phosphorus limited at that time. Note the increased yields with the addition of the first orthophosphorus spike but the lack of a significant increase in yield with the addition of only nitrogen. The lake data indicate phosphorus limitation at all sampling times; the mean inorganic nitrogen to orthophosphorus ratios were 17 to 1 or greater, and phosphorus limitation would be expected.

It should be noted that with the initial addition of orthophosphorus, the sample became nitrogen limited (N/P ratio = 8/1). Therefore, no significant increases in yields resulted from further additions of orthophosphorus.

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the North Carolina National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff months of January and February when two samples were collected. Sampling was begun in March, 1973, and was completed in February, 1974.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the North Carolina District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries were calculated using mean annual concentrations and mean annual flows. Nutrient loads shown are those measured minus point-source loads, if any.

Nutrient loads for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the means of the nutrient concentrations in Paddy Creek and the Linville River at stations C-1 and D-1 and the mean annual ZZ flow.

The operator of the Old Fort wastewater treatment plant provided monthly effluent samples and corresponding flow data.

A. Waste Sources:

1. Known muncipal -

Name	Pop. Served	Treatment	Mean Flow (m^3/d)	Receiving Water
Old Fort*	1,000	act. sludge	924.3	Curtis Creek
Linville**	variable	septic tanks	?	Linville River

2. Known industrial - None

* Byrd, 1973; more than 25% of the waste load is contributed by industry.
** Wiseman, 1975.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/ yr	% of total
a. Tributaries (non-point load) -		
Catawba River	13,500	45.6
North Fork, Catawba River	11,390	38.5
Paddy Creek	100	0.3
Linville River	1,505	5.1
b. Minor tributaries & immediate drainage (non-point load) -	925	3.1
c. Known municipal STP's -		
Old Fort	1,600	5.4
Linville (septic tanks)	110	0.4
d. Septic tanks* -	15	<0.1
e. Known industrial - None	-	-
f. Direct precipitation** -	460	1.6
Total	29,605	100.0

2. Outputs -

Lake outlet - Catawba River 48,705

3. Net annual P loss - 19,100 kg.

* Estimate based on 44 lakeshore dwellings; see Working Paper No. 175.
** See Working Paper No. 175.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/yr	% of total
a. Tributaries (non-point load) -		
Catawba River	172,040	40.3
North Fork, Catawba River	73,685	17.3
Paddy Creek	4,850	1.1
Linville River	90,270	21.1
b. Minor tributaries & immediate drainage (non-point load) -	49,675	11.6
c. Known municipal STP's -		
Old Fort	3,820	0.9
Linville (septic tanks)	4,050	0.9
d. Septic tanks* -	470	0.1
e. Known industrial - None	-	-
f. Direct precipitation** -	28,445	6.7
Total	427,305	100.0

2. Outputs -

Lake outlet - Catawba River 375,270

3. Net annual N accumulation - 52,035 kg.

D. Mean Annual Non-point Nutrient Export by Subdrainage Area:

Tributary	kg P/km^2/yr	kg N/km^2/yr
Catawba River	29	371
North Fork, Catawba River	51	332
Paddy Creek	6	298
Linville River	9	519

* Estimate based on 44 lakeshore dwellings; see Working Paper No. 175.
** See Working Paper No. 175.

E. Yearly Loading Rates:

In the following table, the existing phosphorus loading rates are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Essentially, his "dangerous" rate is the rate at which the receiving water would become eutrophic or remain eutrophic; his "permissible" rate is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic rate would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m^2/yr	1.12	loss*	16.2	2.0

Vollenweider loading rates for phosphorus ($g/m^2/yr$) based on mean depth and mean hydraulic retention time of Lake James:

"Dangerous" (eutrophic rate)	0.94
"Permissible" (oligotrophic rate)	0.47

* There was an apparent loss of phosphorus during the sampling year. This may have been due to non-representative sampling resulting in an underestimation of the phosphorus load (septic tanks in camps and parks, unknown point sources, etc.) or to hypolimnetic drawdown carrying phosphorus solubilized from bottom sediments. The lake data indicate a slight increase in total phosphorus concentration in the deeper samples at station 04 (above Linville Dam), especially during the July and September samplings.

V. LITERATURE REVIEWED

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Park, David, 1974. Personal communication (lake morphometry). NC Dept. of Nat. & Econ. Resources, Raleigh.

Vollenweider, R. A., and P. J. Dillon, 1974. The application of the phosphorus loading concept to eutrophication research. Natl. Res. Council of Canada Publ. No. 13690, Canada Centre for Inland Waters, Burlington, Ontario.

Weiss, Charles M., 1972. A proposal to the Water Resources Research Institute of the University of North Carolina. The trophic state of North Carolina lakes, covering the period July 1, 1972 to June 30, 1973. U. of North Carolina, Chapel Hill.

Wiseman, Robert C. (Avery County Mgr.), 1975. Personal communication (population estimates of Linville, NC: 3,000 per month for three summer months, and 200 per month the remainder of the year). Linville.

VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	3719	LAKE WACCAMAW	534
2	3716	SANTEELAH LAKE	446
3	3711	MOUNTAIN ISLAND LAKE	419
4	3707	HIWASSEE LAKE	414
5	3704	FONTANA LAKE	392
6	3713	LAKE NORMAN	346
7	3708	LAKE JAMES	334
8	3710	LOOKOUT SHOALS	327
9	3715	RHODHISS LAKE	296
10	3705	LAKE HICKORY	283
11	3717	LAKE TILLERY	246
12	3709	LAKE JUNALUSKA	220
13	3702	BLEWETT FALLS LAKE	200
14	3718	WATERVILLE RESERVOIR	140
15	3701	BADIN LAKE	124
16	3706	HIGH ROCK LAKE	76

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500- MEAN SEC	MEAN CHLORA	15- MIN DO	MEDIAN DISS ORTHO P	INDEX NO
3701	BADIN LAKE	33 (5)	7 (1)	27 (4)	27 (4)	3 (0)	27 (4)	124
3702	BLEWETT FALLS LAKE	7 (1)	13 (2)	7 (1)	73 (11)	93 (14)	7 (1)	200
3704	FONTANA LAKE	100 (15)	33 (5)	93 (14)	100 (15)	3 (0)	63 (9)	392
3705	LAKE HICKORY	27 (4)	60 (9)	53 (8)	13 (2)	80 (12)	50 (7)	283
3706	HIGH ROCK LAKE	13 (2)	20 (3)	0 (0)	0 (0)	23 (2)	20 (3)	76
3707	HIWASSEE LAKE	87 (13)	80 (12)	87 (13)	47 (7)	50 (7)	63 (9)	414
3708	LAKE JAMES	60 (9)	87 (13)	80 (12)	7 (1)	23 (2)	77 (11)	334
3709	LAKE JUNALUSKA	47 (7)	27 (4)	43 (6)	20 (3)	50 (7)	33 (5)	220
3710	LOOKOUT SHOALS	53 (8)	47 (7)	60 (9)	67 (10)	60 (9)	40 (6)	327
3711	MOUNTAIN ISLAND LAKE	73 (11)	73 (11)	43 (6)	53 (8)	87 (13)	90 (13)	419
3713	LAKE NORMAN	67 (10)	53 (8)	73 (11)	40 (6)	23 (2)	90 (13)	346
3715	RHODHISS LAKE	20 (3)	67 (10)	33 (5)	93 (14)	70 (10)	13 (2)	296
3716	SANTEELAH LAKE	93 (14)	93 (14)	100 (15)	60 (9)	23 (2)	77 (11)	446
3717	LAKE TILLERY	40 (6)	40 (6)	13 (2)	33 (5)	70 (10)	50 (7)	246
3718	WATERVILLE RESERVOIR	0 (0)	0 (0)	20 (3)	80 (12)	40 (6)	0 (0)	140
3719	LAKE WACCAMAW	80 (12)	100 (15)	67 (10)	87 (13)	100 (15)	100 (15)	534

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P
3701	BADIN LAKE	0.042	0.680	466.750	7.190	14.900	0.012
3702	BLEWETT FALLS LAKE	0.090	0.655	476.889	4.167	10.800	0.034
3704	FONTANA LAKE	0.011	0.550	392.650	3.438	14.900	0.007
3705	LAKE HICKORY	0.047	0.320	461.000	7.275	13.400	0.008
3706	HIGH ROCK LAKE	0.090	0.580	477.454	14.283	14.800	0.017
3707	HIWASSEE LAKE	0.015	0.240	420.555	5.678	14.200	0.007
3708	LAKE JAMES	0.020	0.160	428.866	7.660	14.800	0.006
3709	LAKE JUNALUSKA	0.031	0.560	462.000	7.233	14.200	0.009
3710	LOOKOUT SHOALS	0.026	0.370	459.167	4.200	13.800	0.008
3711	MOUNTAIN ISLAND LAKE	0.018	0.270	462.000	5.580	12.800	0.005
3713	LAKE NORMAN	0.019	0.330	446.667	5.807	14.800	0.005
3715	RHODHISS LAKE	0.061	0.305	462.111	3.578	13.600	0.019
3716	SANTEELAH LAKE	0.011	0.160	366.400	5.360	14.800	0.006
3717	LAKE TILLERY	0.040	0.470	468.600	6.827	13.600	0.008
3718	WATERVILLE RESERVOIR	0.103	0.860	468.333	3.817	14.400	0.041
3719	LAKE WACCAMAW	0.018	0.120	455.667	3.583	9.800	0.004

APPENDIX B

CONVERSIONS FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX C

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR NORTH CAROLINA 10/21/75

LAKE CODE 370H LAKE JAMES

TOTAL DRAINAGE AREA OF LAKE(SQ MI) 381.00

TRIBUTARY	SUB-DRAINAGE AREA(SQ MI)	NORMALIZED FLOWS(CFS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
3708A1	381.00	848.00	612.00	650.00	579.00	581.00	765.00	691.00	673.00	808.00	730.00	850.00	886.00	723.36
3708A2	179.00	349.00	442.00	485.00	456.00	344.00	294.00	267.00	276.00	272.00	276.00	276.00	313.00	336.78
3708B1	85.60	147.00	162.00	188.00	168.00	116.00	90.00	85.00	110.00	101.00	103.00	102.00	115.00	123.70
3708C1	6.30	12.00	14.00	16.00	15.00	11.00	8.70	8.10	9.10	8.90	9.10	8.90	10.00	10.88
3708D1	67.20	167.00	184.00	212.00	190.00	133.00	103.00	99.00	126.00	114.00	119.00	115.00	132.00	140.93
3708Z2	42.90	96.00	114.00	128.00	118.00	85.00	69.00	65.00	72.00	70.00	72.00	71.00	81.00	86.58

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 381.00
SUM OF SUB-DRAINAGE AREAS = 381.00

TOTAL FLOW IN = 8402.79
TOTAL FLOW OUT = 8673.00

MEAN MONTHLY FLOWS AND DAILY FLOWS(CFS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
3708A1	3	73	1830.00	25	1720.00				
	4	73	1560.00	15	263.00				
	5	73	1910.00	20	509.00				
	6	73	1150.00	23	117.00				
	7	73	1040.00	24	832.00				
	8	73	550.00	12	46.00				
	9	73	1100.00	15	2040.00				
	10	73	767.00	14	100.00				
	11	73	664.00	10	540.00				
	12	73	452.00	8	390.00				
	1	74	1480.00	6	2110.00	20	114.00		
	2	74	1220.00	2	664.00	16	1620.00		
3708A2	3	73	960.00	25	635.00				
	4	73	660.00	15	435.00				
	5	73	780.00	20	370.00				
	6	73	515.00	23	450.00				
	7	73	360.00	24	370.00				
	8	73	365.00	12	415.00				
	9	73	235.00	15	260.00				
	10	73	325.00	14	235.00				
	11	73	300.00	10	155.00				
	12	73	640.00	8	440.00				
	1	74	645.00	6	675.00	20	420.00		
	2	74	620.00	2	635.00	16	515.00		

TRIBUTARY FLOW INFORMATION FOR NORTH CAROLINA 10/21/75

LAKE CODE 370H LAKE JAMES

MEAN MONTHLY FLOWS AND DAILY FLOWS(CFS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
370BB1	3	73	550.00	25	280.00				
	4	73	380.00	15	210.00				
	5	73	500.00	20	185.00				
	6	73	250.00	23	210.00				
	7	73	78.00	24	185.00				
	8	73	100.00	12	140.00				
	9	73	54.00	15	200.00				
	10	73	95.00	14	62.00				
	11	73	88.00	10	39.00				
	12	73	250.00	8	180.00				
	1	74	350.00	6	205.00	20	135.00		
	2	74	315.00	2	180.00	16	126.00		
370BC1	3	73	40.00	25	22.00				
	4	73	30.00	15	16.00				
	5	73	30.00	20	14.00				
	6	73	18.00	23	16.00				
	7	73	11.00	24	14.00				
	8	73	12.00	12	13.00				
	9	73	7.20	15	12.00				
	10	73	10.00	14	7.70				
	11	73	26.00	10	5.00				
	12	73	26.00	8	16.00				
	1	74	26.00	6	22.00	20	14.00		
	2	74	22.00	2	21.00	16	16.00		
370BD1	3	73	450.00	25	220.00				
	4	73	300.00	15	165.00				
	5	73	370.00	20	145.00				
	6	73	135.00	23	165.00				
	7	73	90.00	24	145.00				
	8	73	118.00	12	110.00				
	9	73	67.00	15	160.00				
	10	73	107.00	14	74.00				
	11	73	102.00	10	48.00				
	12	73	267.00	8	202.00				
	1	74	326.00	6	238.00	20	143.00		
	2	74	232.00	2	206.00	16	147.00		
370BZZ	3	73	300.00						
	4	73	190.00						
	5	73	220.00						
	6	73	125.00						
	7	73	70.00						
	8	73	80.00						
	9	73	50.00						
	10	73	70.00						
	11	73	65.00						
	12	73	180.00						
	1	74	150.00						
	2	74	145.00						

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 75/12/20

370801
35 44 02.0 081 53 31.0
LAKE JAMES
37111 NORTH CAROLINA

11EPALES 2111202
3 0105 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/24	15 05 0000		12.4		5M	53	7.50	11	0.050	0.300	0.240	0.026
	15 05 0005		10.3	10.4		60	7.50	11	0.050	0.200	0.230	0.024
	15 05 0015		10.3	10.0		63	7.40	12	0.040	0.200K	0.230	0.027
	15 05 0045		8.5	9.4		63	7.40	11	0.040	0.200K	0.290	0.030
	15 05 0075		7.3	9.2		63	7.20	13	0.040	0.200K	0.310	0.032
	15 05 0100		7.1	9.2		63	7.20	13	0.050	0.200	0.320	0.030
73/07/05	16 10 0000		24.4		4M	65	9.40	11	0.070	0.700	0.060	0.004
	16 10 0005		24.4	12.2		60	9.30	11	0.050	0.300	0.040	0.002
	16 10 0010		22.4	9.7		69	9.20	14	0.060	0.200	0.040	0.004
	16 10 0015		21.4	9.7		70	8.40	15	0.060	0.200	0.160	0.005
	16 10 0035		12.8	7.1		60	6.70	10K	0.070	0.200K	0.310	0.007
	16 10 0050		8.6	5.9		63	6.50	14	0.050	0.200K	0.390	0.030
	16 10 0085		8.2	5.8		68	6.50	18	0.050	0.200K	0.430	0.025
73/09/24	15 15 0000		26.2		4M	64	7.20	15	0.040	0.400	0.030	0.006
	15 15 0005		25.2	7.2		65	6.40	13	0.030	0.300	0.020	0.009
	15 15 0015		23.4	1.0		76	6.40	18	0.040	0.300	0.030	0.010
	15 15 0025		17.1	0.4		41	6.20	13	0.040	0.300	0.190	0.014
	15 15 0045		9.2	4.6			6.20	13	0.050	0.300	0.390	0.014
	15 15 0065		8.0	4.4			6.20	14	0.040	0.200	0.420	0.015
	15 15 0090		8.1	4.5			6.30	26	0.660	1.100	0.040	0.010

K VALUE KNOWN TO BE
LESS THAN INDICATED

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STORET RETRIEVAL DATE 75/10/20

370802
35 44 46.0 081 57 20.0
LAKE JAMES
37111 NORTH CAROLINA

11EPALES
3

2111202
0055 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/24	15 40	0000	12.8		18	50K	7.30	10K	0.070	0.400	0.290	0.019
	15 40	0003	11.0	10.0		50K	7.30	10K	0.080	0.200	0.300	0.015
	15 40	0015	10.5	9.8		50K	7.20	10K	0.080	0.200	0.290	0.017
	15 40	0030	10.2	10.0		55	7.10	10K	0.090	0.200	0.280	0.020
	15 40	0050	9.3	9.6		50K	7.10	10	0.070	0.200	0.310	0.033
73/07/05	15 15	0000	28.7	10.5	72	69	9.20	14	0.120	0.600	0.060	0.008
	15 15	0004	27.3	10.1		55	8.80	10	0.100	0.600	0.050	0.005
	15 15	0010	24.4	9.2		61	7.70	14	0.060	0.300	0.060	0.004
	15 15	0025	19.1	4.0		60	6.60	14	0.080	0.200K	0.290	0.014
	15 15	0035	12.9									
	15 15	0050	9.6	2.1		70	6.40	17	0.060	0.200K	0.460	0.011
73/09/24	14 45	0000	25.4		75	86	8.60	18	0.050	0.700	0.030	0.011
	14 45	0003	25.1	8.6		75	7.90	16	0.040	0.500	0.020	0.010
	14 45	0015	23.5	5.2		81	6.80	18	0.060	0.300	0.070	0.012
	14 45	0025	17.4	0.2		82	6.40	15	0.170	0.400	0.130	0.012
	14 45	0035	10.5	0.4			6.30	18	0.250	0.500	0.150	0.008
	14 45	0050	9.4	0.7			6.30	23	0.470	0.900	0.020	0.007

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 73/10/20

37JM02
35 44 46.0 081 57 20.0
LAKE JAMES
37111 NORTH CAROLINA

MALES 2111202
3 0055 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/03/24	15 40	0000	.007	1.1
	15 40	0004	.004	
	15 40	0015	.005	
	15 40	0030	.013	
	15 40	0050	.012	
73/07/05	15 15	0000	.020	2.3
	15 15	0004	.021	
	15 15	0010	.030	
	15 15	0025	.042	
	15 15	0051	.049	
73/09/24	14 45	0000	.034	4.2
	14 45	0005	.036	
	14 45	0015	.038	
	14 45	0025	.037	
	14 45	0045	.033	
	14 45	0050	.038	

STORET RETRIEVAL DATE 73/10/26

370803
35 44 02.0 080 51 02.0
LAKE JAMES
37023 NORTH CAROLINA

11EPALES 2111202
3 0104 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/24	09 45	0000	13.0		56	60	6.40	16	0.050	0.600	0.030	0.003
	09 45	0004	12.1	11.5		55	6.20	15	0.020	0.200	0.050	0.003
	09 45	0015	11.7	10.4		58	6.10	16	0.030	0.300	0.080	0.010
	09 45	0045	10.1	4.8		58	7.90	16	0.040	0.300	0.170	0.016
	09 45	0075	8.5	4.9		62	7.80	17	0.040	0.300	0.190	0.011
	09 45	0100	7.8	4.5		62	7.80	18	0.030	0.300	0.190	0.007
73/07/06	09 45	0000	28.7	9.1	70	63	9.20	15	0.050	0.900	0.060	0.007
	09 45	0007	28.1	4.4		55	9.10	13	0.040	0.300	0.040	0.005
	09 45	0018	24.0	7.8		50K	6.50	16	0.070	0.200	0.050	0.005
	09 45	0040	19.1	4.3		55	6.50	15	0.070	0.300	0.080	0.003
	09 45	0070	17.2	5.0		58	6.40	16	0.060	0.600	0.230	0.003
	09 45	0095	16.1	4.6		60	6.40	16	0.070	0.200K	0.280	0.006
	09 45	0120	12.4	2.2		63	6.30	18	0.070	0.200	0.370	0.005
73/09/24	14 00	0000	26.2		10K	56	6.40	14	0.050	0.400	0.030	0.009
	14 00	0005	26.1	7.8		55	6.70	14	0.050	0.200	0.020	0.011
	14 00	0020	25.8	6.2		54	6.50	12	0.050	0.300	0.020	0.010
	14 00	0040	25.2	1.4		63	6.40	14	0.070	0.200	0.030	0.010
	14 00	0060	23.5	0.4		64	6.30	17	0.020K	0.200	0.060	0.010
	14 00	0080	21.8	0.4		61	6.30	17	0.120	0.300	0.020	0.009
	14 00	0100	18.0	0.6		55	6.20	16	0.200	0.400	0.030	0.006

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL Date 75/12/20

37303
35 44 02.0 077 51 02.0
CAPE JAMES
37023 NORTH CAROLINA

FEMALES 2111202
1 0104 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/03/29	09 45	0000	0.037	12.9
	09 45	0004	0.032	
	09 45	0015	0.028	
	09 45	0045	0.037	
	09 45	0075	0.024	
	09 45	0100	0.019	
73/07/06	09 45	0000	0.022	15.1
	09 45	0007	0.013	
	09 45	0014	0.014	
	09 45	0030	0.010	
	09 45	0070	0.013	
	09 45	0045	0.015	
	09 45	0120	0.014	
73/09/24	14 00	0000	0.016	4.2
	14 00	0005	0.015	
	14 00	0020	0.014	
	14 00	0040	0.013	
	14 00	0060	0.013	
	14 00	0080	0.015	
	14 00	0100	0.020	

STORET RETRIEVAL DATE 73/10/20

370834
35 44 42.0 081 50 24.0
LAKE JAMES
37023 NORTH CAROLINA

FEMALES
3

2111202
0120 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/24	10 00	0000	12.3		44	55	6.10	15	0.030	0.500	0.040	0.006
	10 00	0004	12.4	11.5		55	6.30	17	0.020	0.400	0.040	0.006
	10 00	0020	11.2	10.2		55	6.10	19	0.040	0.400	0.110	0.004
	10 00	0045	10.2	9.8		60	7.90	20	0.040	0.300	0.170	0.013
	10 00	0080	8.4	9.4		62	7.90	19	0.040	0.200	0.170	0.005
	10 00	0115	7.7	9.3		65	7.70	21	0.050	0.200	0.180	0.005
73/07/05	10 55	0000	28.7	9.1	78	57	9.10	13	0.060	0.700	0.050	0.004
	10 55	0001	28.7	9.1		55	9.00	12	0.050	0.400	0.040	0.003
	10 55	0007	28.6	9.3		55	9.00	15	0.060	0.300	0.060	0.003
	10 55	0023	23.4	5.5		62	6.50	18	0.040	0.300	0.080	0.004
	10 55	0030	20.4	3.5		53	6.50	18	0.070	0.300	0.100	0.003
	10 55	0075	16.4	4.4		53	6.60	16	0.050	0.300	0.250	0.003
	10 55	0110	14.9	4.3		57	6.40	11	0.070	0.300	0.280	0.004
73/09/24	16 15	0000	27.1		100	54	6.70	13	0.050	0.400	0.020	0.005
	16 15	0005	26.2	8.6		53	6.70	11	0.040	0.300	0.020	0.005
	16 15	0020	25.8	8.2		49	6.70	10K	0.040	0.300	0.020	0.004
	16 15	0040	25.1	1.6		56	6.40	11	0.080	0.200	0.030	0.005
	16 15	0065	23.1	1.0		59	6.30	14	0.090	0.200	0.030	0.005
	16 15	0090	21.0	0.0		55	6.40	15	0.260	0.500	0.020	0.013
	16 15	0105	19.0	0.0		73	6.60	16	0.640	0.700	0.020	0.008

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/10/20

370804
35 44 42.0 081 50 24.0
LAKE JAMES
37.23 NORTH CAROLINA

11EMALES 2111202
3 0120 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/03/29	10 00	0000	0.031	7.9
	10 00	0004	0.027	
	10 00	0020	0.022	
	10 00	0040	0.031	
	10 00	0060	0.021	
	10 00	0110	0.016	
73/07/06	10 55	0000	0.012	11.1
	10 55	0001	0.013	
	10 55	0007	0.011	
	10 55	0020	0.011	
	10 55	0030	0.011	
	10 55	0075	0.016	
	10 55	0110	0.019	
73/09/24	16 15	0000	0.014	5.9
	16 15	0005	0.013	
	16 15	0020	0.012	
	16 15	0040	0.013	
	16 15	0065	0.015	
	16 15	0090	0.020	
	16 15	0105	0.021	

STORET RETRIEVAL DATE 75/10/20

370805
35 46 23.0 081 51 17.0
LAKE JAMES
37023 NORTH CAROLINA

11EPALES
3

2111202
0059 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/03/29	12 00	0000	12.1		60	50K	7.90	18	0.030	0.400	0.130	0.004
	12 00	0004	12.0	10.6		50K	7.80	19	0.030	0.200	0.130	0.003
	12 00	0015	11.4	10.1		50K	7.80	17	0.040	0.200K	0.150	0.005
	12 00	0030	10.7	10.1		50K	7.80	18	0.040	0.200K	0.150	0.006
	12 00	0055	9.6	9.6		50K	7.80	17	0.040	0.200	0.180	0.004
73/07/06	13 28	0000	28.6	8.7	108	55	8.30	12	0.060	0.900	0.050	0.005
	13 28	0005	28.2	8.7		50K	8.60	11	0.050	0.400	0.040	0.002
	13 28	0010	27.5	8.9		50K	8.20	10	0.040	0.400	0.040	0.002
	13 28	0020	23.4	6.1		50K	6.50	11	0.060	0.400	0.060	0.002
	13 28	0035	20.6	2.9		50K	6.30	12	0.100	0.500	0.090	0.004
	13 28	0049	18.4	3.6		50K	6.30	12	0.100	0.400	0.110	0.004
73/09/24	15 45	0000	27.5		108	45	6.90	11	0.040	0.600	0.020	0.006
	15 45	0005	26.4	8.0		46	7.00	10	0.040	0.500	0.020	0.005
	15 45	0020	25.9	6.6		47	6.80	11	0.030	0.300	0.020	0.005
	15 45	0035	25.4	5.4		46	6.50	11	0.050	0.300	0.020	0.005
	15 45	0045	24.8	3.3		44	6.30	11	0.080	0.300	0.030	0.005

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 73/10/20

370805
35 46 23.0 081 51 17.0
LAKE JAMES
37023 NORTH CAROLINA

11EPALES 2111202
3 0059 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/03/29	12 00	0000	0.019	4.1
	12 00	0004	0.021	
	12 00	0015	0.019	
	12 00	0030	0.017	
	12 00	0055	0.025	
73/07/06	13 28	0000	0.013	9.1
	13 28	0005	0.009	
	13 28	0010	0.009	
	13 28	0020	0.014	
	13 28	0035	0.010	
	13 28	0049	0.014	
73/09/24	15 45	0000	0.014	7.7
	15 45	0005	0.015	
	15 45	0020	0.015	
	15 45	0035	0.016	
	15 45	0045	0.021	

APPENDIX E

TRIBUTARY and WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 75/10/20

370HA1 L5370HA1
35 44 30.6 0H1 50 00.0
CATAWBA RIVER
37039 7.5 GLEN ALPINE
O/LAKE JAMES
RD 1223 BRDG .25 DOWNSTREAMLINVILLE DAM
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/25	11 45		0.250	0.200	0.016	0.012	0.035
73/04/15	13 35		0.176	0.310	0.048	0.019	0.050
73/05/20	12 02		0.110	0.605	0.042	0.014	0.040
73/06/23	12 50		0.170	0.210	0.046	0.021	0.055
73/07/24	09 30		0.147	0.450	0.033	0.039	0.090
73/08/12	10 40		0.160	0.440	0.038	0.040	0.055
73/10/14	14 45		0.130	0.200	0.023	0.054	0.095
73/11/10	12 20		0.064	0.490	0.028	0.136	0.180
73/12/08			0.200	0.300	0.016	0.068	0.115
74/01/06	12 30		0.294	1.000	0.072	0.028	0.055
74/01/20	11 15		0.232	0.190	0.036	0.024	0.035
74/02/02	12 00		0.200	0.300	0.025	0.055	0.105
74/02/16	12 20		0.216	0.400	0.050	0.066	0.110

STORET RETRIEVAL DATE 73/10/20

STORET
45 03 00.0 092 00 00.0
CATAWBA RIVER
37 19 MARION
FLORENCE JAMES
SECONDARY RD RNDG 2 MI N MARION
FLORENCE 211120
0030 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL % MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/25	10 10		0.158	0.230	0.025	0.009	0.030
73/04/15	12 10		0.154	0.342	0.038	0.018	0.035
73/05/20	13 45		0.175	0.230	0.033	0.013	0.035
73/06/25	10 30		0.220	0.340	0.046	0.042	0.115
73/07/24	07 30		0.189	0.450	0.050	0.013	0.035
73/08/12	13 00		0.198	0.560	0.024	0.062	0.080
73/10/16	12 30		0.098	0.250	0.052	0.026	0.055
73/11/10	13 00		0.056	0.200	0.040	0.032	0.055
73/12/08			0.208	1.000	0.056	0.040	0.045
74/01/06	13 15		0.144	0.100	0.040	0.008	0.020
74/01/20	12 00		0.208	0.100	0.028	0.032	0.050
74/02/02	13 30		0.208	0.100K	0.005	0.015	0.025
74/02/16	12 45		0.142	0.200	0.025	0.015	0.030

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/10/20

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 3/0000I                 L>3/0600I
35 44 30.0 081 59 30.0
NORTH FORK CATAWBA RIVER
3F        MAP MCDOWELL CO
1/LAKE JAMES
RD 1552 ABOUT 5 MI NNE OF MARION
11EMALES                    2111204
4                           0000 FEET   DEPTH
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DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/25	11 30		0.270	0.150	0.030	0.026	0.050
73/04/15	13 15		0.150	0.390	0.110	0.019	0.033
73/05/20	11 15		0.120	0.440	0.022	0.040	0.072
73/06/23	12 00		0.210	0.320	0.026	0.027	0.055
73/07/24	21 00		0.290	1.500	0.681	0.115	0.240
73/08/12	11 15		0.140	0.115	0.015	0.036	0.045
73/10/14	14 15		0.096	0.790	0.048	0.064	0.105
73/11/10	12 30		0.158	0.400	0.056	0.368	0.420
73/12/08			0.210	1.000	0.052	0.036	0.050
74/01/05	11 45		0.270	0.100K	0.036	0.008	0.020
74/01/20	11 45		0.204	0.100K	0.012	0.016	0.050
74/02/02	11 20		0.210	0.100K	0.095	0.025	0.040
74/02/16	11 45		0.194	0.300	0.010	0.045	0.090

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/10/20

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 STORET          LOCATION
39 46 00.0 084 52 30.0
FAULT CREEK
17       MIAMI COUNTY
17LAKE JAMES
MAY 12D 0000 .5 MI SW OF LONGTOWN
11FMALES                 2111204
4                        0000 FEET  DEPTH
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DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/25	11	00	0.042	0.120	0.036	0.005K	0.005K
73/04/15	14	07	0.026	0.140	0.033	0.005K	0.005K
73/05/20	10	35	0.013	0.270	0.015	0.005K	0.005K
73/06/23	14	30	0.024	0.440	0.037	0.005K	0.010
73/07/24	20	30	0.058	1.760	0.066	0.007	0.010
73/08/12	10	03	0.058	0.200	0.035	0.006	0.015
73/10/14	13	30	0.029	0.500	0.069	0.005K	0.005K
73/11/10	10	00	0.012	0.900	0.032	0.012	0.050
73/12/04			0.052	0.400	0.068	0.005K	0.005K
74/01/06	10	45	0.084	0.500	0.064	0.005K	0.005K
74/01/20	11	00	0.044	0.100K	0.016	0.005K	0.005K
74/02/02	10	00	0.036	0.100K	0.010	0.005K	0.005K
74/02/15	10	30	0.056	0.300	0.020	0.005K	0.005K

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/10/20

3708J1 LS3708J1
35 47 30.0 081 52 30.0
LINVILLE RIVER
37 MAP BURKE CO
T/LAKE JAMES
MAP 126 AROG 2.5 MI NNE OF LONGTOWN
11EPALES 2111204
0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/03/25	10	35	0.220	0.180	0.029	0.006	0.015
73/04/15	14	20	0.115	0.210	0.058	0.005K	0.005K
73/05/20	10	00	0.044	0.600	0.024	0.005K	0.010
73/06/23	13	45	0.100	0.320	0.030	0.005K	0.015
73/07/24	20	00	0.120	2.300	0.077	0.005K	0.035
73/08/12	09	35	0.048	2.360	0.110	0.008	0.010
73/10/14	13	35	0.022	0.200	0.018	0.009	0.025
73/11/10	09	20	0.010K	0.200	0.024	0.008	0.010
73/12/08			0.100	0.500	0.048	0.008	0.010
74/01/06	10	25	0.240	0.400	0.024	0.005K	0.007
74/01/20	10	20	0.048	0.100K	0.008	0.005K	0.005K
74/02/02	14	45	0.176	0.300	0.020	0.005K	0.005K
74/02/16	10	00	0.168	0.400	0.020	0.005	0.015

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/12/20

37JMAA A37JMAA 40010000
39 3M 43.0 0M2 0W 43.0
OLD PORT S.T.P.
37039 IS MARION CO.
T/CLARE JAMES
CURTIS CREEK
LITERALLS 2141204
" 0000 Feet DEPTH

DATE FROM TO	TIME DEPTH OF DAY FEET	00530 SUSPENDED SOLIDS NON-VOLATILE MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
73/06/27 11 00								
CP(I)-		1.470	4.500	2.500	1.890	4.600	0.180	
73/06/27 17 00								
73/07/30 11 00								
CP(I)-		2.130	14.400	3.000	4.900	10.500	0.200	0.260
73/07/30 15 00								
73/08/08 11 00								
CP(I)-		0.024	11.500	3.640	2.200	3.100	0.280	
73/08/08 15 00								
73/10/15 11 00								
CP(I)-		0.720	14.500	3.100	4.400	6.700	0.280	
73/10/15 15 00								
73/11/18 11 00								
CP(I)-		0.440	15.000	2.440	3.500	4.200	0.280	
73/11/18 15 00								
74/01/31 11 00								
CP(I)-		0.040	4.300	2.100	3.000	3.300	0.280	
74/01/31 15 00								
74/02/25 11 00								
CP(I)-		0.000	4.000	2.450	2.100	3.200	0.200	
74/02/25 15 00								
74/03/13 00 00								
CP(I)-		3.040	4.000	3.400	3.400	5.000	0.250	0.230
74/03/13 24 00								
74/04/10 00 00								
CP(I)-		0.080	5.300	1.300	1.730	2.800	0.230	
74/04/10 24 00								
74/05/07 00 00								
CP(I)-		0.100	11.000	3.750	1.600	4.400	0.230	
74/05/07 24 00								
74/06/11 00 00								
CP(I)-		0.180	20.000	3.600	3.000	5.500	0.230	
74/06/11 24 00								
74/07/10 00 00								
CP(I)-		0.170	11.000	1.750	3.100	4.500	0.250	
74/07/10 24 00								

STORET RETRIEVAL DATE 75/10/20

370BAA AS370BAA P0010000
35 38 43.0 082 09 43.0
OLD FORT S.T.P.
37039 13 MARION N.C.
T/LAKE JAMES
CURTIS CREEK
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00038 NITRATE-TOTAL MG/L	00623 TOT P FUEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
74/08/07 00 00									
CP(T)-									
74/08/07 24 00					0.650	1.100			